WHIRRAKEE

August 1990

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MONTHLY NEWSLETTER OF THE BENDIGO FIELD NATURALISTS CLUB

Bendigo Field Naturalists Club Inc.
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Membership of the Bendigo Field Naturalists Club is open to all those interested in natural history. The subscription rates are: Single $16.00; Family $20.00; Pensioner and Junior $11.00. **Whirrakee** subscription only is $16.00.

General meetings are held on the second Wednesday of each month at the Conference Rooms, Department of Agriculture, Midland Highway, Epsom. Meetings start at 7:30pm and conclude with supper. The Annual meeting is held in September.

Committee meetings are held on the third Wednesday of each month in members' homes. Members of the Committee are the Office Bearers listed above, together with the following members: A Bridley; R Fyffe; L Leeson; M Stone.

Excursions The assembly point for excursions is outside the Ministry of Education complex in Havlin Street East, Bendigo, unless otherwise specified. Full-day excursions normally commence at 10am (usually on a Sunday); half-day excursions normally commence at 2pm and may be either on a Saturday or Sunday. Full-day or half-day excursions are usually held on the weekend following the General meeting. Campouts are held several times each year, usually coinciding with long weekends or holiday periods.

The Bendigo Field Naturalists Club has four sub-groups:

Bird Observers Group: meets on the first Friday of the month at the Agriculture Department, Epsom, at 7:30pm.
President Alan Caddy (47 0659)

Botany Group: meets on the fourth Thursday of the month at 7:30pm in members' homes as announced in the monthly diary.
Convenor Graham Hill (42 4016).

Conservation Group: meets on an 'as required' basis. As far as practicable meetings will be advertised in the **Whirrakee** diary.
Convenor Rod Fyffe, 546 Hargreaves Street, Bendigo (43 7673).

Mammal Survey Group: meets on the third Thursday of the month at 7:30pm in members' homes as announced in the monthly diary.
Chairman Laurie Leeson, 76 Lawson Street, Bendigo (43 0521)
Secretary Bill Holsworth, 13 Nabilla Crescent, Kennington (43 4063)

WHIRRAKEE

Monthly Newsletter of the Bendigo Field Naturalists Club.
Vol. 11, No. 7, August, 1990

Whirrakee takes its name from the Whirrakee Wattle (*Acacia williamsonii*) which is virtually endemic to the Bendigo region.

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Authors are responsible for the accuracy of the information they use and also for any opinions expressed in their articles.

Contributions will be included as soon as possible after they are received, although articles received after the monthly General Meeting will probably be too late for inclusion in the next issue of *Whirrakee*. Articles sent by post should be addressed to: Rodney Orr, 2 Cockerel Court, Bendigo 3550.

Articles in *Whirrakee* may be reproduced but permission should be obtained from the Bendigo Field Naturalists Club and acknowledgement should be given to the author and the Club.

Back issues are available at a cost of 80c each. Complete sets are available at $8.00 for each volume. The above prices do not include postage.

Cover photograph: This photograph (by David McDonald) shows a Bandy Bandy adopting its usual threatening pose when disturbed. As Peter Robertson told us during his talk at last month's meeting, one of these very rare snakes had been found near Inglewood during the recently completed pit-trapping survey of mallee bushlands in the region.

The impact of Cattle Grazing on Native Vegetation.
Author: David Mc Donald

Abstract
The vegetation survey undertaken at One Tree Hill Regional Park from 25-29/11/89 examined a section of Red Box/Red Stringybark Tall Open Woodland containing ungrazed forest and a current grazing lease. Changes in vegetation structure and floristic composition were identified, with a fence line creating an induced boundary. The ecotone created, showed a decrease in shrub height and density within the grazing lease. Shrub species diversity also altered with the favoured grazing lease species being those unpalatable to stock or species able to withstand limited grazing pressure. *Grevillea alpina*, the most commonly occurring shrub, was all but eliminated from the grazing lease. The grass and herb layer showed little change in density, but a marked change in species diversity in favour of exotic and native grasses and exotic herbs. Native herb species showed a decline in diversity. While overstorey species increased slightly downslope, most regrowth was by coppicing with juvenile species limited in their survival opportunities. The impact of intermittent grazing of a small area (34ha) showed a detrimental change on native vegetation both in structure and composition. Hypotheses were tested for these changes which were found to be significant.

Introduction
A vegetation survey using a belt transect of 10 contiguous 15m x 10m quadrats was conducted in One Tree Hill Regional Park between 25/10/89 & 29/10/89. *Eucalyptus polyanthemos / Eucalyptus macrorhyncha* association occurs as a Tall Open Woodland in cojunction with *Eucalyptus goniocalyx* and *Eucalyptus microcarpa* on the slopes and ridges. The ungrazed forest has a rich and variable understorey with shrubs associations including *Grevillea alpina, Brachyloma daphnoides, Cassinia arcuata, Hakea sericea* and *Acacia genistifolia.* A grass understorey component is also characteristic (Morcom 1988).

Geology & History
Folded and thinly bedded Ordovician age sedimentary sandstones and shales provide the base material for the shallow stony loams occurring on the slopes and among reef outcrops. The soils have a low potential for agriculture and are prone to sheet erosion (Morcom 1988).Goldmining activity resulted in clearfelling the One Tree Hill area in the 19th century, and has initiated accelerated erosion, which removed much of the topsoil (Morcom 1988). Average rainfall is 541mm with June being the wettest month. Average maximum daily temperature is 29.2°C in January and 12°C in July. The major growing season is between May and September (Morcom 1988).

The grazing lease studied, No 5383, covers 34ha, and has been held since 1969. The lease is intermittently grazed, often in periods of stress or wet conditions.

Location
The transect site was located approximately 65m north of Pioneer Rd, with the centre crossing the grazing lease boundary.This location is approximately 550m from the Guys Hill Rd entrance to One Tree Hill Regional Park(1090ha) and 7km from Bendigo.

Aims
To compile a preliminary inventory of the vegetation segment.
To analyse the patterns and processes within the vegetation segment.
To test the hypothesis that cattle grazing has altered the grazing lease vegetation structure.

Method
The vegetation survey was carried out by recording environmental parameters, vegetation structure and floristic elements in a belt transect of 10 contiguous 15m x 10m quadrats.The grazing lease boundary fence divided quadrats 1-5(forest) from 6-10(grazing lease). The variables measured and the appropriate methods used for each are shown below.

Variable measured	Method of measurement
Quadrat boundaries, transect direction.	Range poles, 30m tape & compass.
Environmental parameters:	
Aspect	Compass
Slope	Clinometer
Soil temperature	Soil thermometer 15cm at quadrat centres
Soil moisture% &	500gm samples at quadrat centre analysed by Land
Salt level & pH.	Protection Division CFL, Bendigo
Rock outcrop %	Visual estimate
Ground cover %	" "
Micro relief %	" "
Projective foliage cover	" " (Specht 1979)
Vegetation identification:	" " (with reference to field guides)
Vegetation measurements:	
Tree height (m)	Clinometer
Tree diameter (cm)	Tape measure
Tree basal area	Bitterlich stick at 10 random sites in each quadrat
Shrub & Grass density	Point-Quarter method, 10 random sites per quadrat
Shrub height (m)	5m tape of each recorded by Point-Quarter method
Diversity	Point-Quarter method & quadrat methods

Results and Analysis

Vegetation Profile

The dominant overstorey vegetation consisted of a Red Box/ Red Stringybark Tall Open Woodland gradually increasing in height downslope. Associated dominants were Long-leaf Box and Grey Box with the Long-Leaf Box being confined to the higher slopes. All overstorey species had a high percentage of coppice regrowth from previous harvesting. Many of the multi-stemmed trees lacked vitality with some limbs having few or no branches. Juvenile overstorey species located in the grazing lease were heavily pruned. Tree height and foliage cover increases are reflected in the smaller basal area measurements of the downslope trees.

The break point created by the fence line showed a marked change in grass, herb and shrub diversity and frequency along with changes in shrub height and density. The ungrazed forest shrub layer showed a higher average height and density when compared to the grazing lease in which palatable and more sensitive species were being selected against. An increase in grass and herb diversity generally favouring exotic species, together with a feature of more unpalatable shrubs occurred within the grazing lease. *Grevillea alpina* showed a marked decline in this area, while *Acacia genistifolia* and *Helichrysum obcordatum* increased in numbers.With intermittent grazing *Brachyloma daphnoides* increased in frequency but suffered a decrease in density and height. A total of 59 plant species were identified across the transect area.

Diversity

While the mean diversity of species for both grazed and ungrazed forest was similiar the species makeup was different (see Table1). Shrub diversity increased in the grazing lease with successful competition by spiky and unpalatable shrubs like *Helichrysum obcordatum* and *Hibbertia exutiacies*. While total grass and herb diversity marginally decreased within the grazing lease, the native herb layer was diminished with *Burchardia umbellata, Wahlenbergia* sp. and*Themeda australis* being absent. Exotic species diversity increased by 30% in the grazing lease area (see Fig3). The hypothesis that diversity of exotic species was different between the 2 areas was tested and found to be significant:

Forest Exotics Diversity mean:	5.8	Standard Deviation: 1.66
Grazing Exotics Diversity mean:	7.5	Est Pop'n Std Dev : 0.7423
Significance level:	0.02	No significant difference: 5.8+/- 1.5217

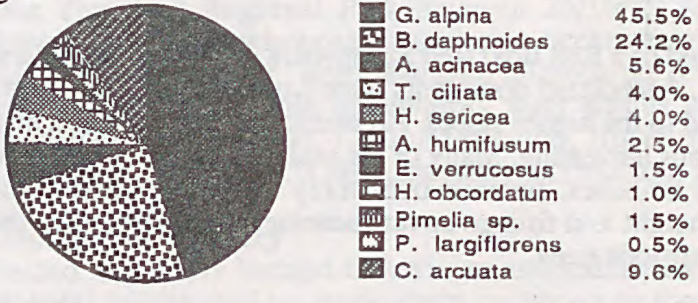
Species Diversity :Table 1

Forest Species only	Grazing Lease Species only
Eucalyptus goniocalyx	*Grass* sp. 1 - Exotic
Burchardia umbellata	*Grass* sp. 2 - Exotic
Helichrysum viscosum	*Hypochoeris radicata* - Exotic
Themeda australis	*Arctotheca calendula* -Exotic
Pultenaea largiflorens	*Poa seiberiana*
Pultenaea peduncalata	*Hibbertia exutiacies*
Prasophyllum sp.	*Daviesia ulicifolia*
Microtis unifolia	*Acacia pycnantha*
Wahlenbergia sp.	*Cheiranthera cyanea*
Thysanotus patersonii	*Caladenia cucullata*
Hakea sericea	
Brunonia australis	

Relative Frequency

Relative frequency was calculated for understorey species for the forest and grazing lease areas. No points of occurrence x 100 (Cox 1980). The shrub layer showed a dramatic change, particularly Σ points sampled with the softer foliage species. Changes in the native species toward more spiky or less palatable species occurring in the grazing lease is evident(Figs 1&2). The relative frequency of exotic grasses & herbs in the grazing lease indicated the successful invasion of these species into a disturbed environment, together with an increase in frequency of some native grasses. Native herbs however suffered a decline.

Fig 1.



Density

Trends shown in species composition, diversity & relative frequency were further supported by changes in plant density & height. Using a formula (Cox 1980) Total Density = Unit Area / (mean point to plant dist)2 applied to each quadrat & converted to the no. species/m2 showed that grass density underwent a 12% decline, from 1272.43 sp/m2 in the forest to 1116.57sp/m2 in the grazing lease. This change was supported by the ground cover % readings. Shrub density underwent a major decline with the density falling from 4.2909sp/m2 in the forest to 1.9259sp/m2 in the grazing lease, a 55% decrease.

The hypothesis that the shrub density change was significant was tested and supported.

Forest shrub Density mean: 4.2909sp/m2 Standard Deviation: 1.4425
Grazing Lse Density mean : 1.9259sp/m2 Est Pop'n Std Dev: 0.6451
Significance level: 0.02 No Significant Diff: 4.2904+/-1.3225

Fig 2.

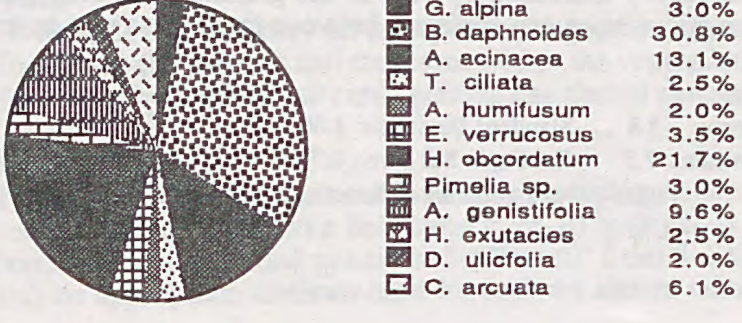
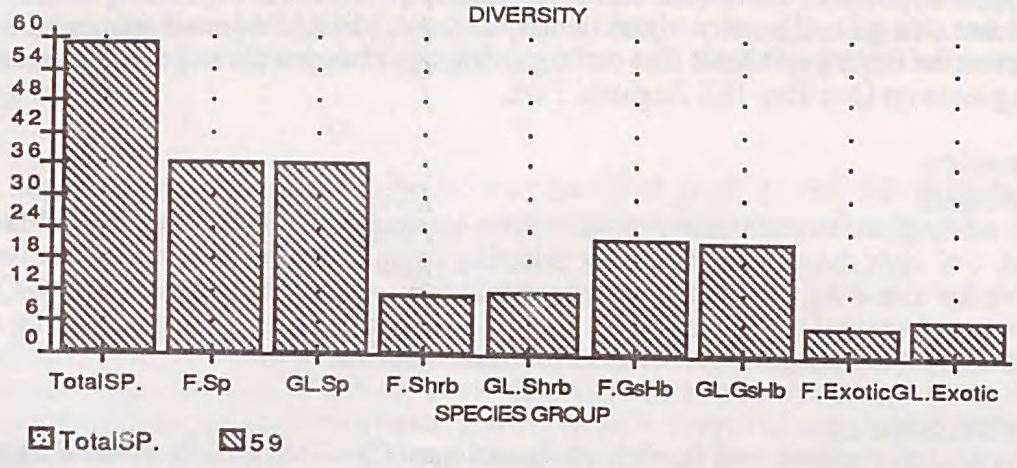


Fig 3.



Shrub Height

Shrub heights showed a decline in average height in the grazing lease (see table 2).Within the grazing lease the main shrub height is attained by unpalatable or spiky species particularly *Helichrysum obcordatum & Acacia genistifolia.*

Shrub Height. Table 2.

	Forest:	std dev	Grazinglease:	std dev	Decrease
Mean shrub height(cm)	52.15	+/-2.15	33.95	+/-4.81	35.0%
B.daphnoides mn(cm)	48.99	+/-2.51	23.73	+/-7.83	51.5%
G. alpina mn(cm)	59.57	+/-5.57	8.67	+/-7.77	85.0%
H. obcordatum mn(cm)	-	-	46.74	-	-

Hypothesis testing for a significant change of shrub height in the grazing lease was also supported.

Forest Height mean: 52.15cm
GrazingLeaseHt mn: 33.95cm
Significance level: 0.02

Standard Deviation: +/-2.15
Est Pop'n Std Dev: 0.9617
No SignificantDiff: 52.15+/-1.97

Environmental Parameters(See Table 3)

Soil conditions were relatively uniform throughout the transect, with variation in soil temperature being affected by shaded or exposed position. Soil moisture recordings were lowest on a disused track in the forest section which allowed rapid water run-off. In the grazing lease a high moisture reading was obtained in an area experiencing run-off from an exposed reef. Ground cover % decreased slightly downslope while foliage cover increased slightly. Rock outcrop was recorded in 80% of the quadrats.

Environmental Parameters: Quadrats 1-10. Table 3.

Environmental Parameter.	Quadrat No:									
	1	2	3	4	5	6	7	8	9	10
Aspect(deg)/Slope(deg)	340/9	355/8	355/6	360/16	010/6	015/6	020/6-9	035/7	040/4.5	045/4
Slope(deg)	5.0	6.5	7.5	1.5	6.0	6.0	6.0/10.0	7.0	4.5	4.0
Soil Moisture %	19.2	17.25	11.09	14.85	14.80	17.80	14.93	25.62	19.18	15.28
pH	5.15	5.09	5.06	5.36	5.14	4.94	5.01	4.90	4.86	4.69
Salt Level (ppm)	28.10	22.27	38.98	22.72	10.62	15.23	30.46	19.78	24.96	17.86
Soil Temperature(deg)	18.5	20.5	21.0	24.0	20.5	20.5	22.0	21.0	18.5	20.5
Rock Outcrop %	5	2	2	2	2	5	10	2	-	-
Ground Cover %	50	55	35	45	45	40	40	35	35	35
Projective FoliageCover %	15-20	15-20	15-20	15-20	10-15	20-25	20-25	20-25	20-25	20-25
Micro-relief height(m)(Reef)	0.3	0.3	0.3	0.5	0.3	0.3	0.6	0.3	-	-

* Soil moisture, pH and Salt Level results from soil samples tested by The Land Protection Division, Conservation Forests & Lands, Curtin St Bendigo.
pH and salt levels in 1:5 Aqueous extract.

Hypothesis Testing

The three hypothesis tests (see Levin & Rubin 1979) used for testing whether there were significant change in diversity, shrub density and shrub height were all supported by the data and supported the main hypothesis that cattle grazing has changed the vegetation structure within the grazing lease on One Tree Hill Regional Park.

Discussion

Methodology

While a few plant species may not have been accurately identified the overall results were not altered. Soil data may be improved by selecting more sampling points. Alternative methods are possible for assessing plant density, frequency, height and diversity, but the Point-Quarter method used was convenient and adequate for the depth of the study. Perhaps a doubling of the random measuring points may provide more precise measurements.

Vegetation Structure

The vegetation structure and floristic composition of One Tree Hill Regional Park has previously been altered by the impacts of tree clearing. The deflected secondary succession on the poor leached soils resulting from this disturbance has allowed invasion by exotic grasses as well as competition between the even age coppice regrowth. The lack of vigour of *Eucalyptus macrorhyncha* is contributed to by this species being at the extremes of its occurrence, with many of the trees being unable to flower or fruit (Franklin et al 1983). Exotic species rarely establish in stable plant communities without prior disturbance and modification of the environment (Anderson 1977).The widespread and at times dense forest shrub layer is indicative of evergreen perennials with slow growth rates being well established in low nutrient conditions (Wallace 1986). The use of the forest as a standard for comparison with the grazing lease, must be considered in light of the area's previous disturbance and the presence of exotic grass species, *Briza maxima & Aira* sp. The change in overstorey foliage cover does not appear to greatly affect the understorey species. The light interception by eucalypts in Open Woodlands is low and light is supplemented by gaps in crown separation and diffuse light patterns (Wallace 1986). Moisture and nutrient competition may be an important factor influencing understorey species.

An abrupt vegetation change (or ecotone) occurs along the grazing lease fence boundary. The forest shrub layer dominated by *Grevillea alpina* crosses to a more open shrub layer with a high *Helichrysum obcordatum* component. Erect understorey species tend to be defoliated under grazing, while prostrate species (eg*Hibbertia exutiacies*) avoid defoliation (Anderson 1977). Shrubs and herbs reduced in number may be palatable to stock and a preferred food. Slow growth rates may also be present in some of these species. In rangeland systems, palatable shrubs and soil subject to degradation have experienced the greatest decline due to grazing (Harrington 1984). *Grevillea alpina* reflects this by changesin relative frequency, height and density. Palatable native herbs appear similarly affected.*Brachyloma daphnoides* suffers a reduction in height in the grazing lease, but is able to withstand the intermittent grazing pressure. It is possible that under a heavier grazing regime this species may also be reduced in density. *Acacia genistifolia* is spiky and untouched when the hard phyllodes form but appears to be grazed when very young. The shrub, *Helichrysum obcordatum*, prolific on the grazing lease, is unpalatable to stock, but responds to pruning which here is mainly by trampling.

The area is generally well drained and suffers a moisture deficiency during the summer months. Stress tolerance strategies must be employed by plants to cope with the excesses and deficiences of physical elements as well as the pressure of disturbance. Opportunistic exotic species, grasses and herbs, can occupy the gaps made by disturbance. Their growth rates are often above that of the native species (Wallace 1986). Anderson (1977) mentions; "grazing by domestic animals is the most obvious way in which native communities can be disturbed." A reduction of native perennials allows more available light, moisture and nutrients for exotics and native grasses. The cool growth season of annual exotics enables them to take advantage of these conditions resulting in the crowding out of native perennials that have summer season growth. Exotic seeds may be distributed by wind or carried by cattle. The native grass species *Danthonia* sp. & *Themeda triandra* do not persist well under heavy grazing and are replaced by exotics which recover well

from grazing pressure (Anderson 1977). Exotics also affect the regeneration of overstorey seedlings. The already limited juvenile tree regeneration is further retarded by the establishment of adult grasses; which under disturbed grazing conditions will compete strongly with tree and shrub seedlings for moisture. Adult tree and shrub growth together will limit the growth of perennial grasses (Harrington 1984).

Fauna Habitat

Changes in the vegetation structure and composition in favour of grass species will discriminate against those animals dependant on the food source and shelter provided by the shrub understorey.

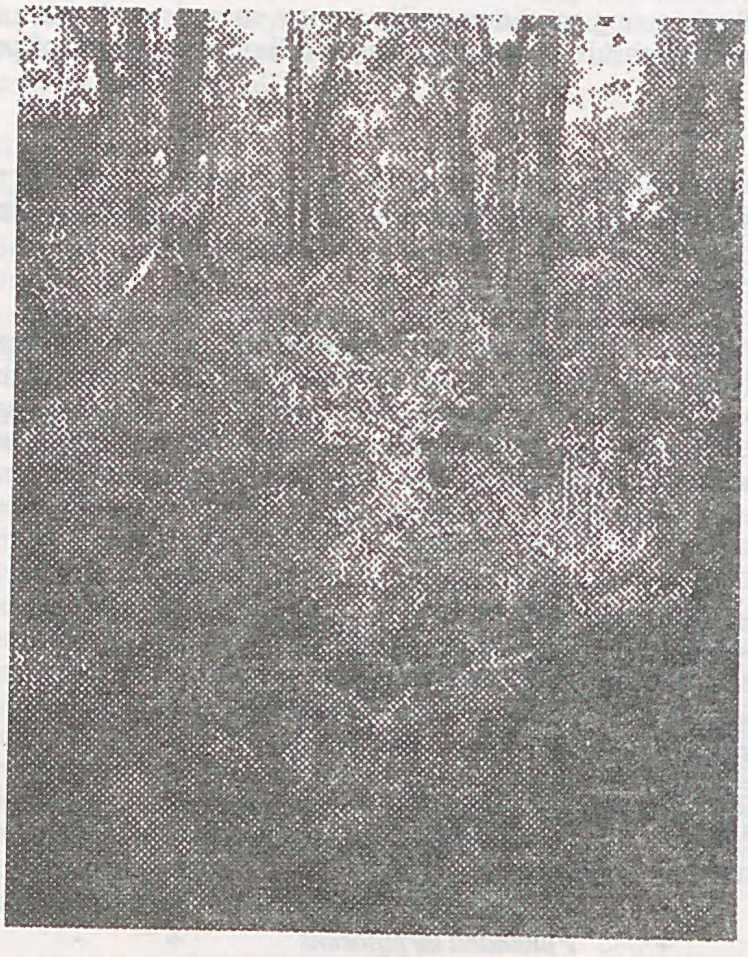
Conclusion

The survey methods used provided a suitable basis for determining vegetation structure and composition changes. The analysis of the collected data showed a marked change in the shrub understorey with palatable shrubs declining in the grazing lease in favour of unpalatable and spiky species. The disturbance of this shrub understorey has allowed the invasion of exotic grasses and herbs. The hypothesis that the differences between the vegetation in the ungrazed forest and on the grazing lease were significant, was supported by the data gathered by these methods.

Species List

	Forest	GrzLease		Forest	GrzLease
Eucalyptus macrorhyncha RED STRINGY BARK	+	+	*Gonocarpus tetragyna*	+	+
Eucalyptus microcarpa GREY +BOX	+	+	*Thelymitra rubra*	+	+
Eucalyptus polyanthemos RED+BOX	+	+	*Astroloma humifusum*	+	+
Eucalyptus goniocalyx LONG LEAF BOX	+	-	*Dianella revoluta*	+	+
Grevillea alpina MOUNTAIN GREVILLEA	+	+	*Danthonia* sp.	+	+
Brachyloma daphnoides DAPHNE HEATH	+	+	*Helichrysum viscosum*	+	-
Acacia genistifolia	+	+	*Helichrysum obcordatum*	+	+
Acacia acinacea	+	+	*Amyema miquelii*	+	+
Hakea sericea	+	-	*Themeda australis*	+	-
Cassinia arcuata	+	+	*Pultenaea largiflorens*	+	-
Tetratheca ciliata	+	+	*Pultenaea peduncalata*	+	-
Dichopogon strictus	+	+	*Prasophyllum* sp.	+	-
Hypochoeris glabra	+	+	*Microtis unifolia*	+	-
Briza maxima	+	+	*Poa* sp.	+	+
Briza minor	+	+	*Calochilus robertsonii*	+	+
Goodenia blackiana	+	+	*Stipa* sp.	+	+
Microsceris scapigera	+	+	*Wahlenbergia* sp.	+	-
Moss sp.	+	+	*Grass* sp. 1 (exotic)	-	+
Lichen sp.	+	+	*Grass* sp. 2 (exotic)	-	+
Austrocheilanthes sp.	+	+	*Daviesia ulicifolia*	-	+
Drosera peltata	+	+	*Cheiranthera cyanea*	-	+
Drosera macrantha	+	+	*Caladenia cucullata*	+	+
Eriostemon verrucosus	+	+	*Poa sieberiana*	-	+
Pimelea sp.	+	+	*Hypochoeris radicata*	-	+
Burchardia umbellata	+	-	*Arctotheca calendula*	-	+
Brunonia australis	+	-	*Hibbertia exutiacies*	-	+
Lomandra sp.	+	+	*Acacia pycnantha*	-	+
Aira sp.	+	+	*Thysanotus patersonii*	+	-
Aira cupaniana	+	+			

+Species recorded - Species not recorded



Ungrazed woodland
This photograph shows the typically dense shrub understory found throughout the area of ungrazed woodland of the study area.

Grazing Lease
This second photograph shows a generally much shorter understory, predominently of grass cover and Grey Everlasting (*Helichrysum obcordatum*)

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Excursion report: Winter flowering Ironbarks

Author: Win Demeo

On Sunday, July 15, 12 members of the BFNC went on an excursion to the Kingower Forest where we saw the following plants and birds in the forest of Red Ironbark and Yellow Gum.

Plants

Red Flame Heath; Pink Common Heath; White Common Heath; *Baeckea ramosissima*; Leafless Currant-bush; Hop-bush; Cranberry Heath; Holly Grevillea; cross between Holly Grevillea &*Grevillea alpina*; Mystery Wattle *Acacia difformis*; Golden Wattle.

Birds

Red Wattlebird; White-plumed Honeyeater; Swift Parrot; Yellow-tufted Honeyeater; Brown-headed Honeyeater; Black-chinned Honeyeater; Dusky Woodswallow; Bellbird; Magpie; Kookaburra; Musk Lorikeet; Little Lorikeet; Sulphur-crested Cockatoo; Galah; Eastern Rosella;

White-browed Babbler; Brown Tree-creeper; Fuscous Honeyeater; Spotted Pardalote; Striated Pardalote; Oriole; Chough.

While we were sitting around having a cup of tea after the walk, the talk was about guest speakers and the fact that some of our members cannot hear them because they speak too softly. There was a suggestion made that we should buy a portable microphone and 2 of the people present each offered to donate $500 towards the cost.

On the Specimen Table
Author: Tom Patullo

Cultivated terrestrial orchids:
Pterostylis Xtoveyana, commonly known as the Mentone Orchid - a member of the Cauline group of Greenhood Orchids, having both flowering and non-flowering plants. This orchid is thought to be a natural hybrid of *Pterostylis alata* and *Pterostylis concinna*. When it was first discovered, it was found growing in coastal areas near Mentone in close proximity to these two presumed parents and having some of the features of both of them. Firstly, because it is a member of the Cauline group, as is *Pterostylis alata* and secondly it is quite obviously one of the Striped Greenhoods, as are both parents (one has only to look through the front of the flower towards the light to see the distinct stripes over the back of the hood). The 3 orchids also have a generally similar appearance in both form and size. Flowering time is May to August. It grows naturally in Victoria and Tasmania favouring coastal areas although it is known from the Brisbane Ranges; however it is not found around Bendigo.

Pterostylis concinna, the Trim Greenhood, differs from its hybrid in that it is not a member of the Cauline group of Greenhoods. Its flower stems arise from the centre of a basal rosette. It grows in south-eastern Australia and up into southern Queensland but is absent from Western Australia and does not grow locally. The other parent of *Pterostylis toveyana, Pterostylis alata*, is found here and grows on One Tree Hill but only in one spot; it was also found recently to grow at Mt Kooyoora in a small number of small colonies and flowered well there this year in June.

Pterostylis scabra var. *robusta* is very similar in every way to our own locally found orchid, *Pterostylis robusta*, the Larger Striped Greenhood. Its flower stem carries 5 large sharp-pointed leaf bracts, the top bract partly enfolding the ovary. It is sometimes called the Sharp Greenhood and is a member of the Cauline group of grenhoods. There are large colonies of *Pterostylis robusta* in the northern Whipstick. I can find no mention of *Pterostylis scabra* in Nicholl's orchid book but it is mentioned briefly in Woolcock's book where it is stated that *Pterostylis scabra* is more robust and the labellum projects further than for *Pterostylis robusta*. The only difference that I can see is that the flower is considerably taller and, as the book says, more robust.

Grevillea intricata, a medium sized shrub to 1.5m tall and 3m across, originates from Western Australia. It is an ideal shrub for central and northern Victoria. It can be cultivated from cuttings and bears erect, tapered, cylindrical spikes of white flowers from Winter till Spring. It creates a neat specimen plant for the native garden and has proved to be frost-hardy in my garden.

Grevillea triloba, a native of Western Australia, has 3-lobed leaves as the name suggests. When given room in an open situation, it grows to 2m tall and about 5m wide. It flowers from Winter until mid-Spring and has a lovely perfume on a fine, sunny day.

Cryptandra amara, commonly called Bitter Cryptandra, is a locally occurring shrub which favours the Maiden Gully, Rocky Rises area where the wallabies keep it well pruned. It has a small, bell-shaped white flower which has a delicate, sweet perfume. It is quite a handsome little shrub when in full flower in Winter.

(Other specimens at this meeting were 2 live snakes brought by Dale Gibbons to demonstrate the similarities and differences of the Whip Snake and the juvenile Brown Snake, both of which are found locally.)

Bird of the night (August 1989): **Brown Goshawk** *Accipiter fasciatus*
Author: W Flentje

Calls are mostly made from near the nest territory and during the breeding season, especially when intruders are in the vicinity or when they are being attacked by other birds. Calls resembling a cackling 'kee kee kee kee' are given by the male and a slower 'yuick yuick yuick' call is made by the female.

Appearance The female is distinctly larger than the male being approximately 55cm long compared with 41cm. The wingspan of the female is about 1m. the plumage is generally brown above and barred brown and white below. The barring on the throat and breast of juveniles is vertical and on the body it is horizontal; in adults the barring is finer and extends right to the throat. The head also becomes greyish in adults and a rufous collar extends around the back of the neck. The end of the tail is rounded; the eyes are bright yellow and the bill is blue-grey becoming black at the hooked tip.

Habitat The Brown Goshawk is found in all areas of the Bendigo district but is not numerous, although, compared to other raptors, it is not uncommon and requires large territories.

Food Consists of rabbits, small mammals, birds, reptiles, and insects.

Breeding In the Bendigo area, breeding usually occurs between September and December. Nests are built high (around 15m and higher), generally in large eucalypts and less often in other trees including exotic pines. Nests are usually located in a vertical fork and are built of sticks and lined with green eucalypt leaves. Two or 3 eggs are laid; they are pale blue with sometimes faint reddish or brown markings. Incubation and brooding appear to be carried out by the female while the male provides the food. The male calls as he returns with food and the female leaves the nest to receive the food a short distance away from the nest. The young are brooded for about 14 days after hatching. At about 3 weeks, the young, which were covered in white down, are losing this and their feathers are beginning to appear; they are noisily begging for food at this stage. They leave the nest after about 5 weeks but continue to be fed by the parents for several more weeks. Juvenile plumage is kept for 15 months and immature plumage for another 12 months. Immature birds are, however, able to breed at 12 months of age.

General The birds are readily confused with Collared Sparrowhawks as the plumage is very similar. The male Brown Goshawk is similar in size to the female Collared Sparrowhawk. The female Goshawk is more readily identified by its larger size and the male Collared Sparrowhawk is much smaller than the others. However, in flight, the Goshawk may be recognised by the rounded end to the tail whereas the Collared Sparrowhawk's tail is squared.

The flight of the Brown Goshawk is rather slow with rapid wing-beats and, while soaring, the wings are held flat. Early in the breeding season the courting behaviour includes calling to each other in the air and displaying by flying upwards, diving, and chasing one another.

Food is usually obtained on the ground and the birds often perch on a limb watching for movement of suitable prey. They are sometimes seen flying swiftly beneath the forest canopy, searching for prey. This behaviour usually results in loud agitation calls from alarmed honeyeaters and other birds. The birds can become very aggressive while raising young in the nest and for a period after leaving the nest; they are not afraid to make physical contact with humans who come too near the young and care needs to be taken to protect the eyes and head.

Bird Notes and Observations: June
Author: Bird Observers Group

Highlights
Cape Barren Goose, 1, between Dingee & Mitiamo, 1/7/90
Black Falcon, 1, near Prairie, 9/6/90
Black Falcon, 1, near Dingee, 11/6/90
Little Raven, 140, Campbell's Forest, 9/6/90
Dusky Woodswallow, 30 to 40, Strathfieldsaye, 2/6/90
Brolga, 7, Winghee Swamp, 11/6/90

Observations: local
Little Eagle, 1, Mandurang, 8/5/90
Black-shouldered Kite, Epsom West, 9/6/90
Whistling Kite, 1, Bendigo, 23/6/90
Collared Sparrowhawk, 1, Kangaroo Flat, 29/6/90
Nankeen Kestrel, 1, Epsom/White Hills, 4/7/90
Nankeen Kestrel, 1, Epsom/White Hills, 5/7/90
Red-capped Robin, 1 male, Kamarooka, 6/6/90
Zebra Finch, 10, near Prairie, 19/6/90
Yellow-billed Spoonbill, 1, Mandurang, 12/6/90
Barn Owl, 1 dead on road, near Campbell's Forest, 9/6/90
Tawny Frogmouth, 1, Mandurang, 15/6/90
Black-faced Cuckoo-shrike, 6, Paivella, 9/6/90
Tree Sparrow, 6, Bendigo Hospital, 8/7/90
Singing Honeyeater, 3, Terrick Terrick State Park, 10/6/90
White-fronted Honeyeater, 1, Terrick Terrick State Park, 10/6/90
Little Grassbird, 1, Calivil, 12/6/90

Observations: non-local
Wedge-tailed Eagle, 1, Seymour City, 18/6/90
White-breasted Sea Eagle, 1, near Murray River west of Echuca, 17/6/90

Lists
Calivil, June 90
Terrick Terrick State Park, 10/6/90
Tang Tang & Winghee Swamps, 11/6/90
Campbell's Forest to Mitiamo, 9/6/90
Junortoun, June 90

Notes
The Dusky Woodswallow has long been known as a predator of bees. It has extended its depredations to another communal hymenopteran (bees, wasps & ants), the European Wasp. A flock of about 30 to 40 birds were seen feeding near a wasp nest and 7 wasps were seen to be taken by the Woodswallows at distances of up to 15 metres from the hive. It is thought that the Woodswallows probably took many more over a period of days in the vicinity. The hive now appears to be deserted so three cheers for the Woodswallows!

It has been a vintage period for birds of prey. Of particular interest was a high density of Brown Falcons and Australian Kestrels - up to one Brown Falcon per kilometer and one Kestrel per 2km recorded in places between Campbell's Forest and Mitiamo. As well, there have been records of an interesting range of hawks and eagles. It is not known what the attraction has been.

Black-faced Cuckoo-shrikes have been seen commonly around Bendigo this Winter in some places. It is unusual to see these birds feeding on the ground but a group of about 5 birds were feeding on irrigated pasture. Again, the prey is unknown.

The Cape Barren Goose turns up occasionally in the district and one very nervous bird was seen sitting on a dam between Dingee and Mitiamo. Some of the geese reported in Western Victoria are known to originate in South Australia. This is one species that appears to be fighting back after appearing endangered just a few years ago.

This does not seem to be the case with the Brolga in the Bendigo district. Seven Brolgas were seen feeding amongst the dry timber on the western side of the Winghee Swamp. The Tang Tang - Winghee area is one of the few places they are still seen, usually only 2 or 3 at a time.

From the Mailbag
Author: Laurie Leeson

Each month the club receives a number of newsletters and magazines; some by subscription and some in exchange for *Whirrakee*. These are available from the club librarian at club meetings.

Park Watch
The latest issue of this quarterly magazine (No. 161 June '90) has an article describing aspects of the history, values and management of 'South Gippsland's Marine and Coastal Parks'. These were reserved in 1986 and include Wilsons Promontory Marine Park and Marine Reserve, Corner Inlet Marine and Coastal Park, Nooramunga Marine and Coastal Park and Shallow Inlet Marine and Coastal Park.

The Very Fast Train proposal is very much in the news and brief articles have appeared in previous issues of Park Watch. 'Very Fast Train Developments' is a more detailed article looking at why the VFT should not go through East Gippsland. This is potentially an enormous project with many implications, one of the more significant being the environmental impacts if the Gippsland route is chosen.

Ecos
The winter issue of this magazine produced by CSIRO has an article titled 'Restoring the Murray - Darling Basin' which discusses observations and investigations into salinity, water use and plants in this region. It begins with a quote from a letter written in 1853 to Lt. Governor La Trobe describing problems on a property in south-western Victoria. This indicates that land degradation and salinity have been of concern in some areas since early settlement. Studies have been done to look at the role of trees in controlling water table levels and salinity and should help in making decisions on where to plant, what species to use and at what density. Part of this work involved devising a method for measuring water flow in the stems of trees. It enabled daily water use to be determined and also showed variations during the day.

'Keeping Track of Corrosion' looks at investigations into corrosion of metals under different environmental conditions.

One of the main elements of the debate over the future of the south-eastern forests, around the towns of Eden and Bombala in southern New South Wales, is the effect of logging on the native wildlife. 'South-eastern Forests: Felling and Fauna' discusses findings of research by CSIRO and the Forestry Commission of New South Wales.

'Can Trees Help Curb the Greenhouse Effect?' examines the role of plant growth in helping reduce carbon dioxide levels in the atmosphere.

'Bass Strait Scallops in Trouble' presents data on the effects of dredging on scallop beds. Bass Strait scallops have almost disappeared from fish shops because the resource has been nearly fished out.

Other publications received this month include:
Conservation News Vol. 22 No. 4 May '90.
Environment Victoria Issue 77 May/June '90.
Geelong F.N.C. Newsletter No. 284 June '90.
Ballarat F.N.C. Excursion-News Sheet June '90.
Sunraysia F.N.C. Sun-Nat Vol.29 No.5 May '90.
Castlemaine Naturalist No.157 June '90.
The Bird Observer No. 698 June '90.

Diary

Meetings

Wednesday August 8	'Introduced fish in our rivers and streams'. John Clements (Department of Conservation and Environment)
Wednesday September 12	Annual General Meeting. As usual, the formal election of the Club's Office Bearers will be conducted, to be followed by a slide showing of members' slides and supper.

Bird Observers Group

Friday September 7, 7:30 pm, Department of Agriculture, Epsom.
Topic: Comparisons between the World Bird Walks of 1954 and 1990.
Bird of the Night: White-naped Honeyeater.

Botany Group

Thursday August 23, 7:30 pm, J Kellam's home, 7 Patrick Street, Bendigo (43 5745).

Mammal Survey Group

Thursday August 16, Contact the Secretary, Bill Holsworth, 13 Nabilla Crescent, Kennington (43 4063) for the location of this meeting.

Committee meeting

Wednesday August 15, 8pm, Glenise Moor's home, Sedgwick (39 6254)

Excursions

August 12	Boneseed weed-pull. Leader: Win Demeo. Meet in Bobs Street behind the White Hills Bowling Green at 1pm to help to keep this weed under control.
August 19	Cape Broom weed-pull. Leader: Glenise Moors. Meet at Glenise and Rob Moors' house at 1:30pm and help save the unusual grevillea which is threatened by this weed.